

DESIGN AND FABRICATE THE MOVABLE MULTIFUNCTION
TABLE

MOHAMAD ILME BIN AHMAD BAHRI

UNIVERSITI MALAYSIA PAHANG

BORANG PENGESAHAN STATUS TESIS

JUDUL : TO DESIGN AND FABRICATE A MOVABLE MULTIFUNCTION TABLE

SESI PENGAJIAN: 2010/2011

Saya,

MOHAMAD ILME BIN AHMAD BAHRI
(HURUF BESAR)

mengaku membenarkan tesis Projek Tahun Akhir ini disimpan di Perpustakaan Universiti Malaysia Pahang dengan syarat-syarat kegunaan seperti berikut:

1. Tesis adalah hakmilik Universiti Malaysia Pahang.
2. Perpustakaan Universiti Malaysia Pahang dibenarkan membuat salinan untuk tujuan pengajian sahaja
3. Perpustakaan dibenarkan membuat salinan tesis ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. ****Sila tandakan (✓)**

SULIT

(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub di dalam AKTA RAHSIA RASMI 1972)

TERHAD

(Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)

TIDAK TERHAD

Disahkan oleh

(TANDATANGAN PENULIS)

(TANDATANGAN PENYELIA)

Alamat Tetap:

**Kg Baru Salor,
15100 Kota Bharu,
Kelantan,**

Nama Penyelia

Tarikh: _____

Tarikh: _____

CATATAN:

*

Potong yang tidak berkenaan.

**

Jika tesis ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali sebab dan tempoh tesis ini perlu dikelaskan sebagai SULIT atau TERHAD.

◆

Tesis dimaksudkan sebagai tesis bagi Diploma secara penyelidikan, atau disertai bagi pengajian secara kerja kursus

TO DESIGN AND FABRICATE A MOVABLE MULTIFUNCTION TABLE

MOHAMAD ILME BIN AHMAD BAHRI

Report submitted in partial fulfillment of the requirements

For the award of Diploma in Mechanical Engineering

Faculty of Mechanical Engineering

UNIVERSITI MALAYSIA PAHANG

NOVEMBER 2010

SUPERVISOR'S DECLARATION

I hereby declare that I have checked this project report and in my opinion this project is satisfactory in terms of scope and quality for the award of Diploma in Mechanical Engineering.

Signature :

Name of Supervisor : CHE KU EDDY NIZWAN BIN CHE KU HUSIN

Position :

Date :

STUDENT'S DECLARATION

I hereby declare that the work in this report is my own except for quotations and summaries which have been duly acknowledged. The report has not been accepted for any degree and is not concurrently submitted for award of other degree.

Signature :

Name : MOHAMAD ILME BIN AHMAD BAHRI

ID Number : MB 08108

Date :

DEDICATION

Bismillahi Rahmanirahim, In the name of Allah I start my dedication with thankful to God that give me opportunity to finish my final year project. To my parents especially my father Ahmad Bahri B Mohd Nor and my mother, Nor Azizah Bt Pak Adid that give me a lot of motivation and support for me to finish this project. They are also my inspiration of what I get succeed until now. Here I want to thank to my friend that have help me during this project. Beside that, I am grateful to become a student that can teach me how to be a good person.

Also to the grateful to my supervisor, Mr. Che Ku Eddy Nizwan B Che Ku Husin that give me guide to me about this project and step by step to finish this project. And to all mechanical staff at laboratory the give me a guide to fabricate this project. Without them there could be difficult to me to complete this task. Thanks a lot to my university and the other lectures in their support and advice towards this project.

ACKNOWLEDGEMENT

First of all, I would like to express the gratitude and appreciation to all those who gave me the possibility to complete this project. Special thanks to my supervisor Mr Che Ku Eddy Nizwan B Che Ku Husin that help me to finish this project fabrication and report. He help me to choose the design of this project and give me an idea for this project. He also give me an advice and guide. Without his opinion and idea there could be difficult to me to complete this final year project.

I also like to acknowledge with much appreciation the crucial role of the staff in mechanical laboratory especially in sheet metal and welding laboratory. And also thankful to my friend that give me some idea to my project design and them also help me in the laboratory. Here I also want to thanks to my family for their support and advice.

Finally, special thanks to Mr Rozikin against as the laboratory coordinator, who has help me in the fabrication process and share his knowledge on this final year project. He also sacrifice his time with family to open the laboratory at weekend.

ABSTRACT

This report presents the table that more focusing on the computer table and has many functions. It also can use in the lab and movable. Most of the table in the laboratory is fixed and don't have many function. This table is ease the worker or student in the lab while used it. This report will also show the function of the each part of table. Material used to produce this table is zinc plate. The purpose of the table is designed more focusing on computer table. Ways and forms an attractive installation design to make it easy to used. Several aspects should be given full attention to ensure that this project can be carried out in line with the initial planning and be completed within the time supposed.

ABSTRAK

Laporan ini membentangkan tentang meja yang banyak fokus ke arah meja komputer yang mempunyai banyak kegunaan. Meja ini juga boleh digunakan di dalam makmal dan boleh bergerak. Kebanyakan meja di dalam makmal tidak boleh bergerak dan tidak mempunyai banyak kegunaan. Meja ini memudahkan pekerja atau pelajar apabila menggunakan meja ini. Laporan ini juga menunjukkan kegunaan meja ini. Meja yang digunakan untuk membuat meja ini ialah kepingan zink. Tujuan meja ini direka untuk mengfokuskan kearah meja komputer. Cara-cara dan bentuk yang menarik direka untuk menjadikan meja ini mudah digunakan. Beberapa aspek perlu diberikan perhatian sepenuhnya bagi memastikan projek ini dapat dijalankan seiring dengan perancangan awal dan dapat disiapkan dalam masa yang sepatutnya.

TABLE OF CONTENT

		PAGE
SUPERVISOR DECLARATION		ii
DECLARATION		iii
DEDICATION		iv
ACKNOWLEDGMENT		v
ABSTRACT		vi
ABSTRAK		vii
TABLE OF CONTAIN		xi
LIST OF FIGURE		xii
CHAPTER 1	INTRODUCTION	
	1.1 Introduction	1
	1.2 Problem Statement	1
	1.3 Objectives of Project	2
	1.4 Scope of Project	2
	1.5 Flow Chart	3
CHAPTER 2	LITERATURE REVIEW	
	2.1 Introduction	4
	2.2 The Stainless Steel Laboratory Table	4
	2.3 Executive Computer Table	5
	2.4 Versatile Connections Computer Lab Table	6
	2.5 The Fabrication theory	7
	2.5.1 Pneumatic Shearing machine	7
	2.5.2 Bending Machine	8

2.5.3	Drilling Machine	9
2.6	Properties of the Material	9
2.6.1	Chemical Properties	10
2.6.2	Physical Properties	10

CHAPTER 3 METHODOLOGY

3.1	Introduction	12
3.2	Overall Research Methodology	12
3.3	Design and Measuring Process	13
3.3.1	Design Concept 1	13
3.3.2	Design Concept 2	14
3.3.3	Design Concept 3	15
3.3.4	Final Design	16
3.4	Material Selection	16
3.5	Shearing Process	17
3.6	Bending Process	18
3.7	Drilling and Riveting Process	19
3.8	Finishing Process	19
3.9	Summary	20

CHAPTER 4 RESULT AND DISCUSSION

4.1	Introduction	21
4.2	Project Problem	21
4.2.1	Literature review	21
4.2.2	Designing and Sketching	21
4.2.3	Fabrication Process	22
4.2.4	Material Preparation	22
4.2.5	Budget Preparation	23
4.3	Problem During Fabrication Process	22
4.3.1	Design	22
4.3.2	Riveting Process	22
4.4	Result	23

4.4.1	Final Product	24
4.4.2	Material Selection	24
4.4.3	Components of Product	25
4.4.4	Function of Product	26

CHAPTER 5 CONCLUSION AND RECOMMENDATION

5.1	Introduction	27
5.2	Conclusion	27
5.3	Recommendation	27
5.3.1	Material Selection	27

REFERENCES 28

APPENDICES

APPENDIX A	29
APPENDIX B	30
APPENDIX C	31

LIST OF FIGURE

Figure		Pages
Figure 1.1	Flow chart	3
Figure 2.1	Stainless steel lab table shown with optional shelf, drawer.	5
Figure 2.2	Executive computer table	5
Figure 2.3	The versatile connection computer lab table	6
Figure 2.4	Pneumatic shearing machines	7
Figure 2.5	Hydraulic bending machines	8
Figure 2.6	Hand-drill machines	9
Figure 2.7	zinc sheet metal	10
Figure 3.1	Design concepts 1	13
Figure 3.2	Design concepts 2	14
Figure 3.3	Design concepts 3	15
Figure 3.4	Final design	16
Figure 3.5	Material Selection	17
Figure 3.6	Shearing Machine	17
Figure 3.7	Bending machine	18
Figure 3.8	Material that used bending machines	18
Figure 3.9	The drilling process	19
Figure 4.1	Movable multifunction table	23
Figure 4.2	CPU holder	23
Figure 4.3	Book rack	24
Figure 4.4	Components of Product	25
Figure 4.5	Function of Product	26

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

This project title is to design and fabricate a movable multifunction table. The project title is more focus to create the new idea for the table. The movable multifunction table has three common functions. First is table for computer and have a special compartment for CPU. Second function is of this table is have a safety compartment and the last function is have a book rack at the top of the table. This table is suitable for laboratory used. This is because the material used. It also can use for the room at home and hostel. The main idea for this table is computer table that have in the market now. From this idea I was add more function and the design is different from the other computer table that have in the market. The movable multifunction table is different from the other table. This is because the design of the table is different and has more function.

1.2 PROBLEM STATEMENT

Mostly the tables that have in the laboratory do not have a special computer compartment. This project is to design and fabricate a table that have a computer compartment and add with more function.

1.3 OBJECTIVE OF PROJECT

The main objective of this project is to design and fabricate a movable multifunction table.

1.4 SCOPE OF THE PROJECT

There are three scopes of this project:

- i. Used for laboratory and factory.
- ii. The function of this table is suitable for used in the laboratory.
- iii. Have a safety compartment.

1.5 FLOW CHART

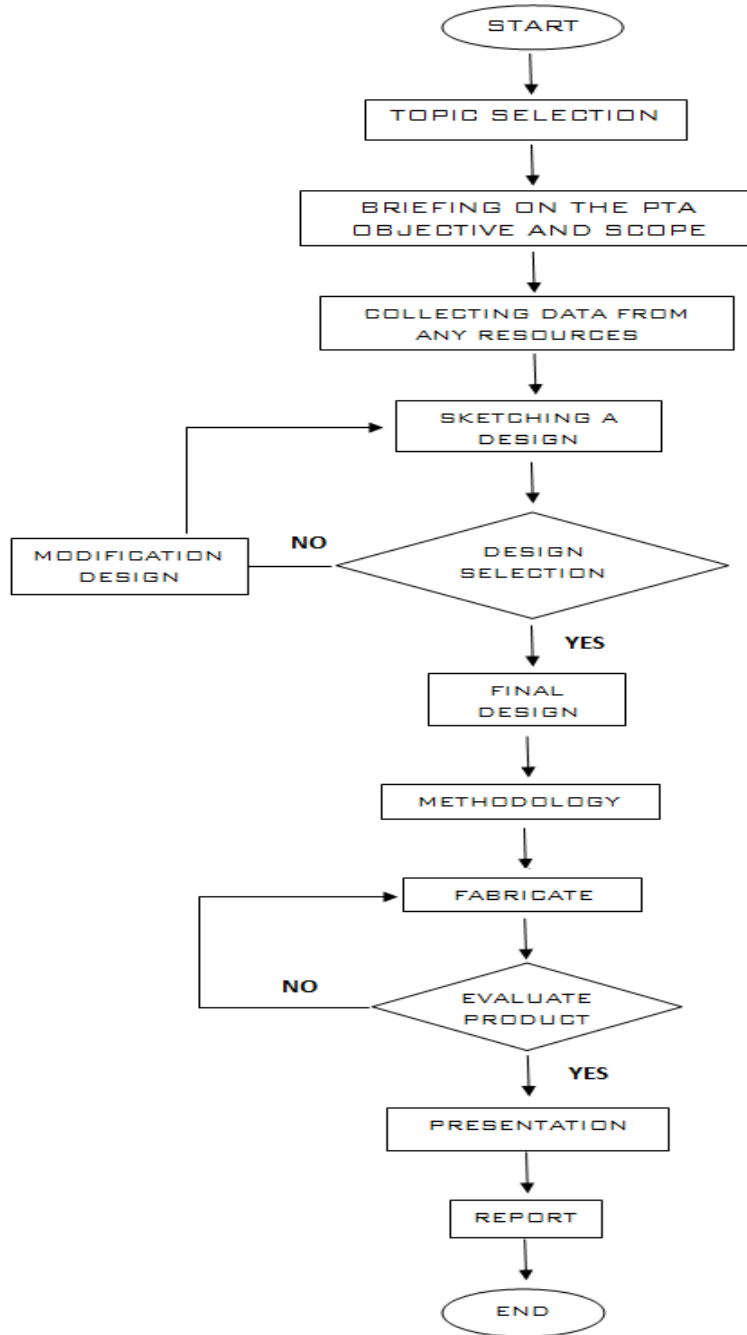


Figure 1.1 Flow chart

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter concludes about the table that have in the market and the survey of the table. In this chapter also conclude the fabrication process and the properties of the material used.

2.2 THE STAINLESS STEEL LABORATORY TABLE

The stainless steel laboratory table is Choose from a wide range of accessories, including all-polymer casters, for maximum corrosion resistance and premium performance. The maximum load of this table is 50 lbs. per square foot up to 600 lbs. This table is used all stainless steel shelves and it also casters allow cart wash and enable autoclaves application.



Figure 2.1: Stainless steel lab table shown with optional shelf, drawer, keyboard tray

2.3 Executive computer table

The executive computer table is have in the market now. This table has a complex design but only focusing one function only. The function of this table only focusing in computer table only. It also doesn't have a safety compartment. The material used is wood. The figure 2.2 shows the executive lab table.



Figure 2.2: Executive computer table

2.4 VERSATILE CONNECTIONS COMPUTER LAB TABLE

The versatile connection computer lab table is focusing on the computer compartment only. The design also focusing to the lab table. The table has a small space at the top of the table. The structure of this design is simple but not too stable. The advantages of this design is can save space.



Figure 2.3: The versatile connection computer lab table

2.5 THE FABRICATION PROCESS

2.5.1 Pneumatic Shearing Machine

The shearing machine is the machine that used pneumatic system. The pneumatic system is the system that used air to control. The function of the machine is to cut the sheet metal like zinc and aluminum. The maximum thickness for this machine is 6 millimeter only and the maximum length is 1000 millimeter only.



Figure 2.4: Pneumatic shearing machines

The safety precaution while used pneumatic shearing machine is the user does not have to wear gloves. The function of this machine is cutting the material. Cutting mean the separation of a physical object, or a portion of a physical object into two portions through the application of an acutely directed force.

2.5.2 Bending Machine

The bending machine is used to bend the material to any degree that we want. The bending machine has many types. It is hydraulic bending machine, and pneumatic bending machine. The bending machine can bend material in any thickness.



Figure 2.5: Hydraulic bending machines

The hydraulic bending machine must be used in a proper method. There are safety precautions when using the machine. The user cannot wear a glove to avoid an accident occurring.

2.5.3 Drilling Machine

The function of a drilling machine is to make a hole with any diameter. Drilling machines also make a hole for the riveting process. Drilling machines have many types, such as hand-drill machines and vertical drilling machines.



Figure 2.6: Hand-drill machines

Drilling is a cutting process in which a hole is originated or enlarged by means of a multipoint, fluted, end cutting tool. As drill is rotated and advanced into the workpiece. Material is removed in the form of chips that move along the fluted shank of drill.

2.6 PROPERTIES OF THE MATERIAL

The material used in this project is zinc. The zinc is more lightweight and the thickness is 1 millimeter only. The zinc has two properties that is chemical properties and physical properties.

2.6.1 Chemical Properties

The zinc is the lustrous bluish white metal. This type of zinc is brittle and crystalline at ordinary temperature. Besides it will be ductile and malleable when heat

between 110°C and 150°C. The zinc is reactive metal combine with oxygen and the other non-metal and will react to release hydrogen. The application of this zinc is used principally for galvanizing iron, more than 50% of metallic zinc goes into galvanizing steel, but is also important in the preparation of certain alloys. It is used for the negative plates in some electric batteries and for roofing and gutters in building construction. Beside that, the zinc also used in die casting in the automobile industry. Zinc oxide is used as a white pigment in watercolours or paints, and as an activator in the rubber industry.



Figure 2.7: Zinc sheet metal

2.6.2 Physical Properties

The zinc has physical properties. The physical properties of the zinc are ductile. The zinc has a high ductility but it less than iron and has hexagonal crystal structure. Zinc can conduct the electric. Zinc have relatively low melting point (420 °C) and boiling point (900 °C). Many alloys contain zinc, including brass, an alloy of zinc an copper.

2.6.3 The Isotopes of Zinc

Five isotopes of zinc occur in nature. Zinc is the most abundant isotopes. This isotope have a long half-life, at 4.3×10^{18} that the radioactivity can be ignored. The most common decay mode of a radioisotopes of zinc with a mass number lower than 66 is electron capture. The decay product resulting from electron capture is an isotope of copper.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

This chapter includes all the process to design and fabricate the movable multifunction table from the beginning to the end of the project. The movable multifunction table is fabricating using many machines. The machine used is shearing machine, bending machine, and hand drill machine.

3.2 OVERALL RESEARCH METHODOLOGY

The overall of this project is start from select the title of the project until the fabrication process. The design of movable multifunction table is using the Solid Work software. The material was select after the designing process is done. The material selection must do before the fabrication process start. The fabrication process is start with cutting the material using shearing machine, continue with bending process using bending machine. After that is drilling process using hand drill machine and riveting process to combine the part. The last process is finishing process that is filing process and spraying process.

3.3 DESIGN AND MEASURING PROCESS

The first step to start the project after select the title is design and set the dimension of the design. The designing process starts with select the correct design

using the screening process. Next is set the dimension of the design. After that, make a 3D design using Solid Work software.

3.3.1 Design Concept 1

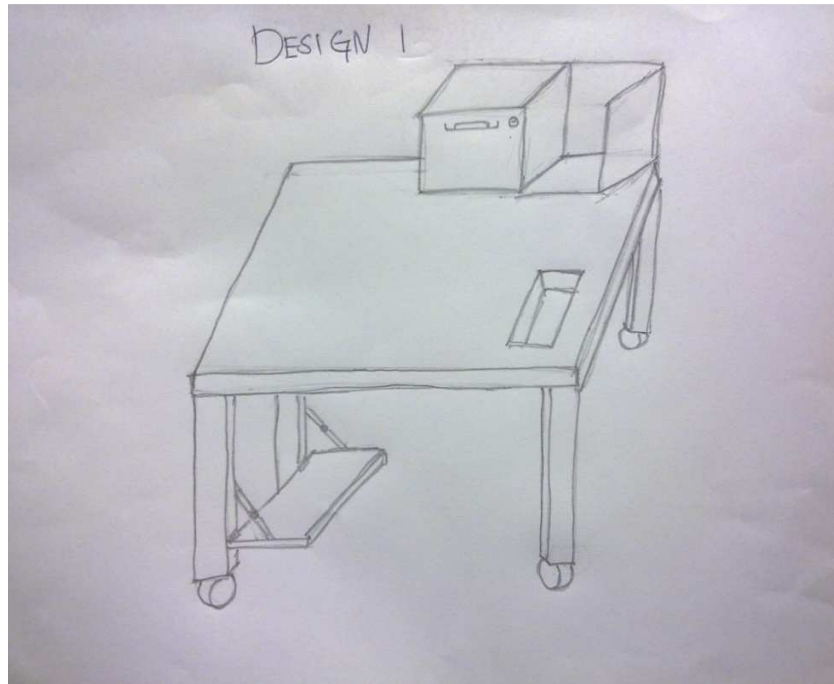


Figure 3.1: Design concepts 1

The advantage of this design is ease the user to pick their thing because the compartment at the top of the table. The disadvantage of this design is the structure of the design is not stable.

3.3.2 Design concept 2

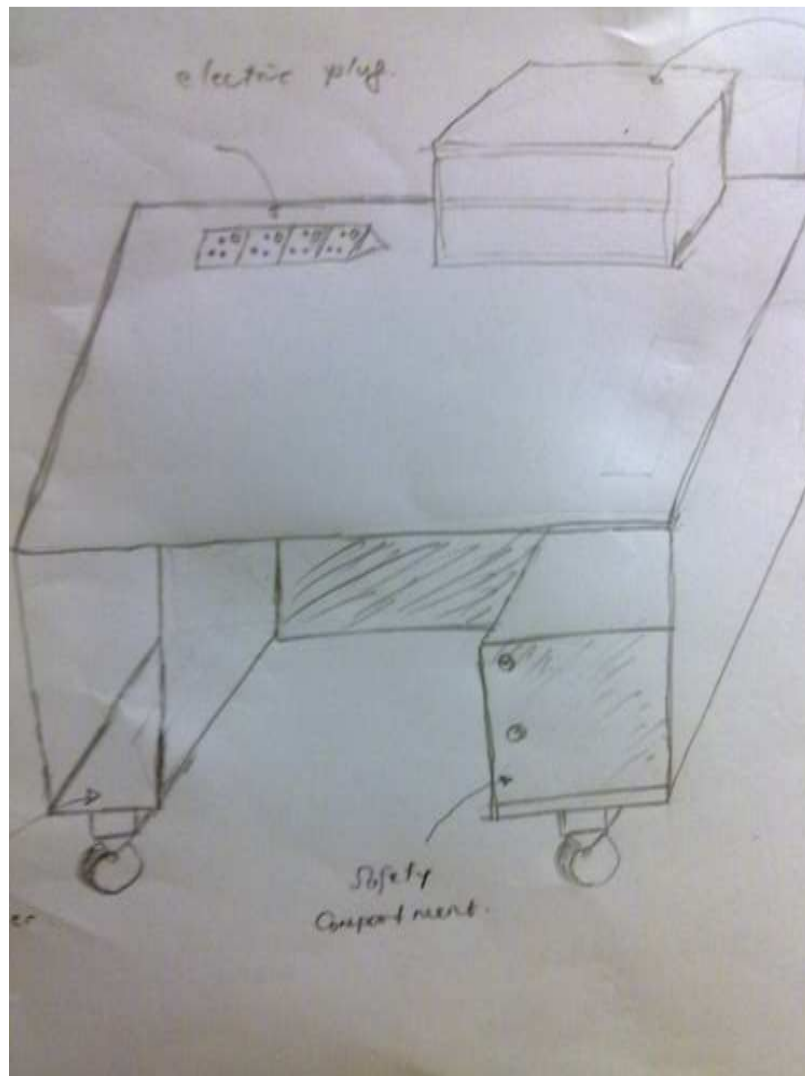


Figure 3.2: Design concepts 2

For the design concept two the advantage is have many function and suitable design for used in the lab. The disadvantage of this table is used more space when used it.

3.3.3 Design Concept 3



Figure 3.3: Design concepts 3

The design concept 1 is have more function than the other design. The safety compartment position is suitable and easy to pick the things in the compartment. The design concept 2 is different from the first table because the design and the wheel used. The safety compartment also different from the first design. The last design is design concept 3. This design is more special than the other design. This is because the shape is different from the other design. The design selection is make by using screening process. The table 3.1 shows the screening process.

Table 3.0: Screening process

characteristic	design		
	1	2	3
Ease of manufacturing	0	0	-
Appearance	0	+	+
Material Usage	0	+	0
Strength of wheel	0	0	0
Weight	0	-	-
Multifunction	0	+	+
Easy To Handling	0	+	-
Sum of (+)	-	4	2
Sum of (0)	7	2	2
Sum of (-)	-	1	3
Net Score	0	3	-1
Rank	2	1	3

3.3.4 Final Design

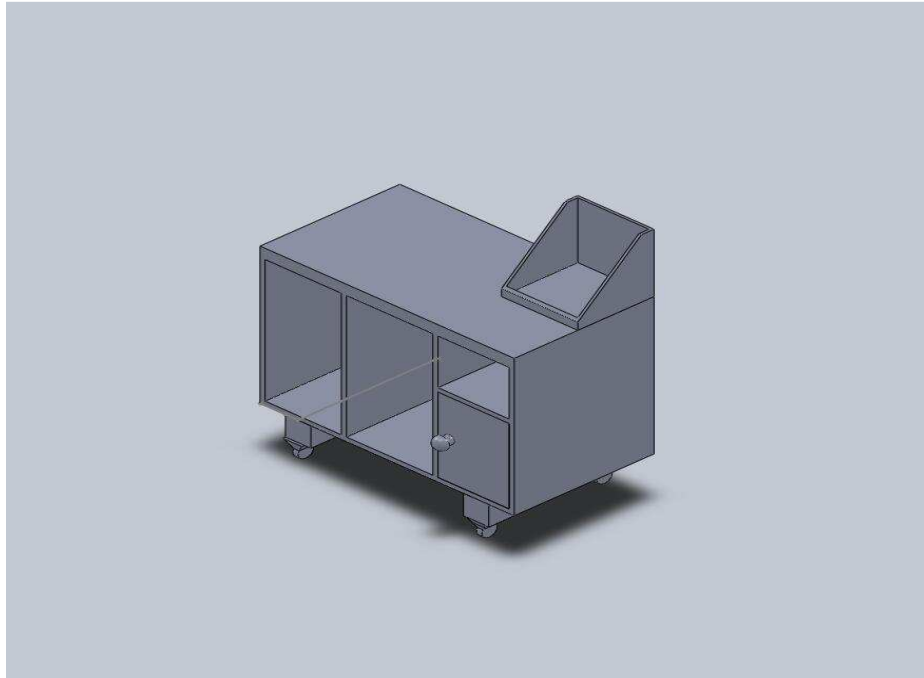


Figure 3.4: Final design

3.4 MATERIAL SELECTION

After finish the design and set the dimension the material was select. The material used is sheet metal with 1mm thickness. This material used because it is lightweight and tough.



Figure 3.5: Material Selection

3.5 SHEARING PROCESS

The shearing process is the process of cutting the material using pneumatic shearing machine. The material was cut to the desired dimension of the design.



Figure 3.6: Shearing Machine

3.6 BENDING PROCESS

The next process after shearing process is bending process. The bending process is the process to bend the material. The bending process is using the hydraulic bending machine.



Figure 3.7: Bending machine



Figure 3.8: Material that used bending machines

3.7 DRILLING AND RIVETING PROCESS

The drilling process is the process of making a hole using hand drill machine. The hole is making for the riveting process. After finishing the drilling process, the next process is riveting process to combine the part of the table.



Figure 3.9: The drilling process

3.8 FINISHING PROCESS

The finishing process is the last process of the fabrication. The finishing process consists of two processes. There is filing process and spraying process. The filing process is to remove the edges using file and the spraying process is spray the table with any color.

3.9 SUMMARY

This chapter described all the process to design and fabricate the movable multifunction table that had be done conclude the design using Solid work software, and the fabrication process that used many type of machines.

CHAPTER 4

RESULTS & DISCUSSION

4.1 INTRODUCTION

CHAPTER 4 is the discussion on the results for modification of this project and several problems occur to the project. This chapter also will discuss mainly about the problems encountered during the whole project was been carried out.

4.2 PROJECT PROBLEMS

4.2.1 Literature Review

The concept and ideas review for this project are not very wide because it is not widely modified by the manufacturer. Students should come with their ideas on the project.

4.2.2 Designing & Sketching

Because of the idea were from the student directly, so there are no references that can be referred. All the drawing and dimension need to generate by student itself.

4.2.3 Fabrication Process

Students need to be given more time to finish fabricating their product because of slackness of skill and training, the joining finishing was not so good but yet can still reliable.

4.2.4 Material Preparation

Some of the needed material needs to buy at the city. University should prepare the material or either provides the place where the material can be obtained from.

4.2.5 Budget Preparation

It is not so effective to use student's money to get the materials. University should provide budget at first place so the student's expenses are not interfere.

4.3 PROBLEM DURING FABRICATION PROCESS

4.3.1 Design

My first plan is to make a border for the design but because of the less material I was change my design. It make me more difficult to finish the project because need more skill to fabricate.

4.3.2 Riveting process

There are so many things happen in fabrication the product during the riveting process. The riveting process will take time to finish it. To complete the riveting process we must do many works. First is must punch before drilling process take place.

4.4 RESULT

After finish the fabrication the result shown as the figure above.



Figure 4.1: Movable multifunction table

The figure above showed the part of the table.



Figure 4.2: CPU holder



Figure 4.3: Book rack

4.4.1 Final Product

The final product was fabricated. The step of the fabrication is followed according to the project planning with literature review, design, and sketching. The final design of the product shown in figure 4.1, figure 4.2 and figure 4.3.

4.4.2 Material Selection

To fabricate and produce this product the material is important element to finish the project. This table only used one material that is zinc plate. Not only has the body of the table but the rack at the top of the table also fabricated using this material. The figure of the rack shows in figure 4.3.

4.4.3 Components of Product

The components of the movable multifunction table shown in the figure 4.4.

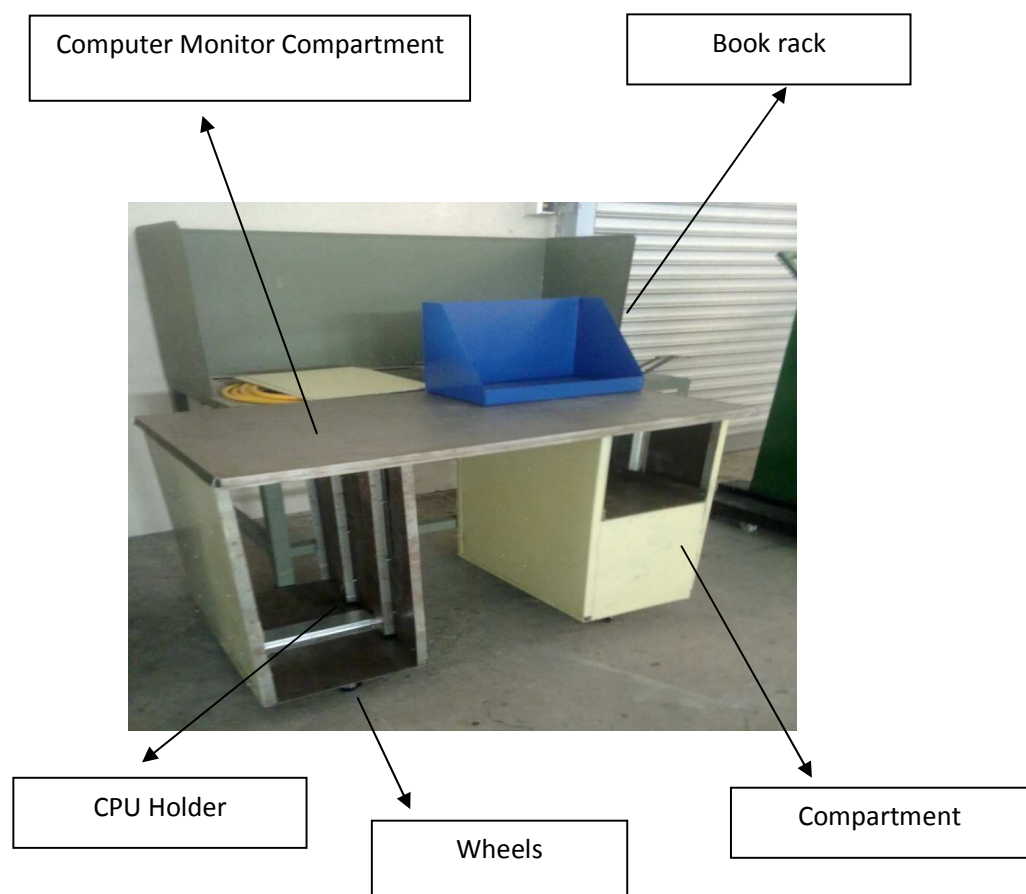


Figure 4.4: Components of Product

4.4.4 The Function of Product

The product is more focusing on computer table. Figure 4.5 shows us the function of the table.

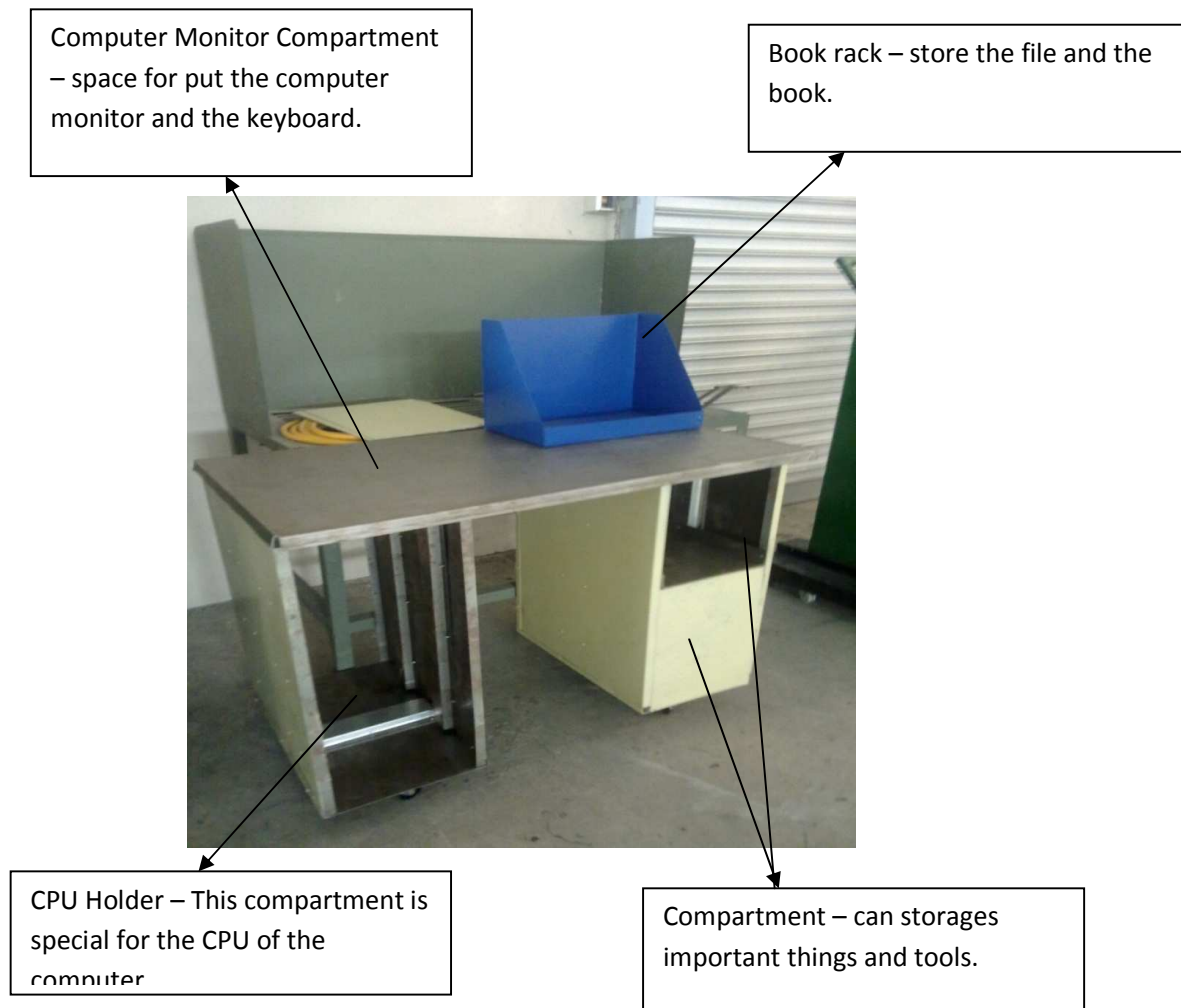


Figure 4.5: Function of Product

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 INTRODUCTION

CHAPTER 5 is the conclusion and recommendation of this project. In this chapter, it will include the objective of this project is fulfilled and some weakness that need to be improve.

5.2 CONCLUSION

The project is finish and the movable multifunction table is suitable to used in lab. The objective of the project is achieved at the end of design and fabrication.

5.3 RECOMMENDATION

The movable multifunction table has its weaknesses which will need to be improved to get a better result.

5.3.1 Material selection

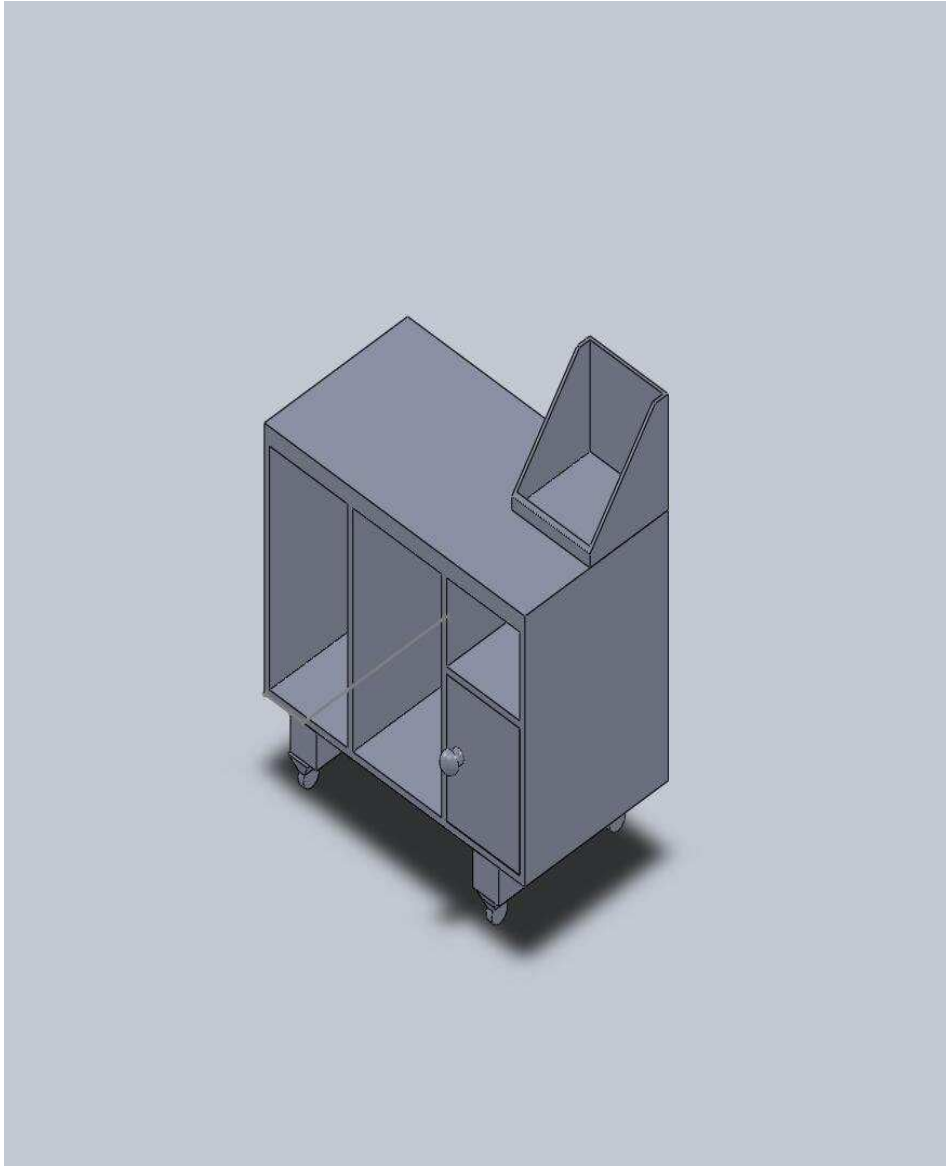
The movable multifunction table is made out of zinc plate. However, it is better to use stainless steel because it more lighter and more stable.

APPENDIX A

ACTIVITIES	WEEK															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Topic Selection And Registration.	Blue	Red														
Literature Review		Blue	Red													
Sketching Design And Collecting Data Or Dimension				Blue	Red											
3d Design And Modeling						Blue	Red									
List Of Material Used							Blue	Red								
fabricate									Blue	Red						
Evaluate product										Blue						
presentation												Blue	Red			
Final report							Blue	Red						Blue	Red	

Gantt Chart

APPENDIX B



APPENDIX C

